Lesson 3.6 Extra Practice

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1. Determine whether each of the following functions is divisible by $x - 2$.
a) $f(x) = x^3 - 6x^2 + 11x - 6$
b) $f(x) = x^4 - 4x^3 + 7x^2 - 12x + 16$
c) $f(x) = x^3 - 2x^2 + 3x - 6$
d) $f(x) = 4x^4 - 3x^3 - x^2 - 11x - 14$
e) $f(x) = -2x^3 + 5x^2 - 3x + 5$
f) $f(x) = x^5 - 2$

2. Determine all of the factors of the function $f(x) = x^3 - 3x^2 + 6x - 4$.

3. State the remainder when $x - 1$ is divided into each polynomial.
a) $x^2 + 6x + 7$
b) $-4x^3 + 2x^2 + 5$
c) $x^4 + 3x^3 - 5x^2 + 4x + 5$
d) $2x^3 + x - 3$
e) $3x^4 - x^3 + 4x^2 - 2x - 5$
f) $4x^3 - 1$

4. Determine whether $3x - 1$ is a factor of each polynomial.
a) $3x^3 + 8x^2 - 21x + 6$
b) $6x^3 - 2x^2 + 12x + 8$
c) $-3x^3 + 4x^2 - 10x + 8$
d) $9x^4 - 3x^3 - 6x^2 + 5x - 5$
e) $3x^4 - 4x^3 - 5x^2 + 5x - 1$
f) $-6x^4 - 7x^3 - 3x^2 + 5x - 2$

5. Factor each polynomial using the factor theorem.
a) $x^3 + 5x^2 + 2x - 8$
b) $2x^3 + 3x^2 - 18x + 8$
c) $x^3 + 4x^2 - 11x + 6$
d) $x^4 - 7x^3 - x^2 + 67x - 60$
e) $x^5 - 45x^3 + 324x$
f) $x^5 - 3x^4 - 23x^3 + 51x^2 + 94x - 120$

6. Factor fully.
a) $f(x) = x^3 - 19x - 30$
b) $f(x) = x^3 + 7x^2 + 4x - 12$
c) $f(x) = x^3 - 13x^2 + 50x - 56$
d) $f(x) = x^4 + 10x^3 + 27x^2 + 2x - 40$
e) $f(x) = x^4 + 3x^3 - 22x^2 - 12x + 72$
f) $f(x) = x^5 + 2x^4 - 10x^3 - 20x^2 + 9x + 18$

7. The polynomial $9x^3 + kx^2 - 5x + 2$ has factors $3x + 2$ and $x - 1$. Determine the value of k.

8. When $ax^3 + 3x^2 - 2x - b$ is divided by $x - 1$, the remainder is 1. When it is divided by $x - 2$, the remainder is 36. Find $a + b$.

9. The function $f(x) = ax^3 - 7x^2 - bx + 24$ has three factors. Two of these factors are $x + 2$ and $x - 3$. Determine the values of a and b, and then determine the other factor.

10. Consider the function $f(x) = x^3 - 5x^2 + kx - 16$. The remainder from $f(x) \div (x + 1)$ is twice the remainder from $f(x) \div (x - 1)$. Determine the value of k.

11. Use the factor theorem to prove that $x^2 - x - 6$ is a factor of $x^3 - 3x^2 - 4x + 12$.